

Dietary Intake Summary Report

The Missouri School-Age Children's Health Services Program

**School Year
2000-2001**

**Missouri Department
of Health and
Senior Services
Division of
Nutritional
Health and
Services**



**Dietary Intake Summary Report
Missouri School-Age Children's Health Services Program:
School Year 2000-2001**

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PREFACE

The Division of Nutritional Health and Services is pleased to present the first published report on nutritional data collected on school-age children who attend schools that participate in the Missouri School-Age Children's Health Services Program (MSCHS). The MSCHS supports population-based health services for school-age children. The Division of Maternal, Child and Family Health administers the MSCHS through contracts with schools, school districts, and local public health agencies. Federal funding through the Title V Maternal and Child Health Block Grant supports the associated efforts of the contractors as well as the Division of Nutritional Health and Services. The Division of Nutritional Health and Services (DNHS) has a contract with the Harvard University School of Public Health to use the Harvard Food Frequency Survey (FFQ) in Missouri. To support this project, DNHS has worked with Harvard to customize and validate the FFQ for use among Missouri students.

I would like to acknowledge the following for their contributions:

- ❑ Ms. Paula Nickelson, Director, Division of Maternal, Child and Family Health, and the staff of that Division's Bureau of Family Health for their vision and support.
- ❑ Ms. Rosalind Wilkins and the staff of the Bureau of Nutrition Policy and Education, Division of Nutritional Health and Services, for their expertise in dietary assessment.
- ❑ Dr. Sharmini Rogers and the staff of the Office of Surveillance, Evaluation and Planning, Division of Nutritional Health and Services, for developing the surveillance system, providing technical assistance to the MSCHS contractors, quality control of the data analysis, and authorship of this report.
- ❑ Ms. Helaine Rockett and the staff of the Harvard University School of Public Health for analysis of the data and leadership in standardized dietary intake assessment.
- ❑ Dr. Eduardo Simoes, State Epidemiologist, Missouri Department of Health and Senior Services, for his thorough review of the contents of this report.
- ❑ All of the administrators, school nurses, and teachers in the MSCHS participating schools for their commitment to improving the dietary health of their students.

In a very real sense, this report is early fruit of the promise of federal, state and local collaborations and public-private partnerships to improve the nutritional health status of all Missourians.



Gretchen C. Wartman, Director
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Missouri Department of Health and Senior Services

Dietary Intake Summary Report

Missouri School-Age Children's Health Services Program: School Year 2000-2001

BACKGROUND

Healthy eating patterns are not only important for optimal growth and development throughout the childhood and adolescent years, but they are also critical in the prevention of various nutrition-related health problems. Poor nutrition can increase the risk of infections, allergies, and anemia. It can also increase the risk of overweight in childhood, adult obesity, heart disease, and other chronic illnesses. It is important to identify risky eating patterns early in life so that nutrition intervention measures may be used to modify and improve the school-age child's nutritional intake.

DATA COLLECTION

During the 2000-2001 school year, through the Missouri School-Age Children's Health Services Program, the Missouri Department of Health and Senior Services collected dietary intake information as assessed by the Harvard Food Frequency Questionnaire (FFQ) from a total of 14,194 children in 341 participating schools (9,931 passed exclusion criteria of improbable caloric intake and were included in analysis). Height and weight measurements were collected from a total of 21,062 children within these same participating schools (19,441 passed exclusion criteria of improbable height and weight for age and sex and were included in the analysis). The difference in number of students participating in both FFQ and the height and weight assessments are due, for example, to parents declining consent for their child to be assessed with the FFQ. **Figure 1** shows the percent distribution by age and gender of food frequency records and **Figure 2** shows the percent distribution by age and gender of height and weight measurements analyzed.

Figure 1. Percent distribution of food frequency records among school-age children (n=9,931).

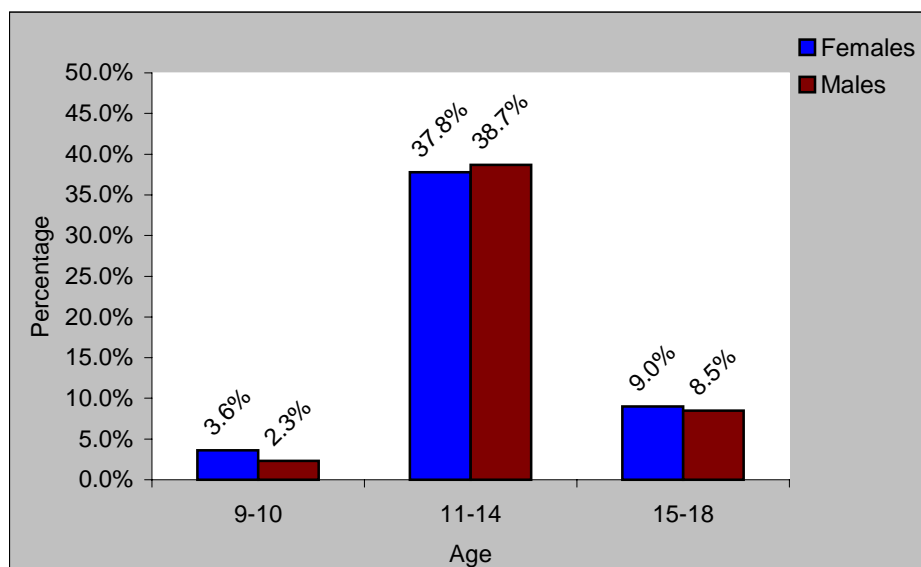
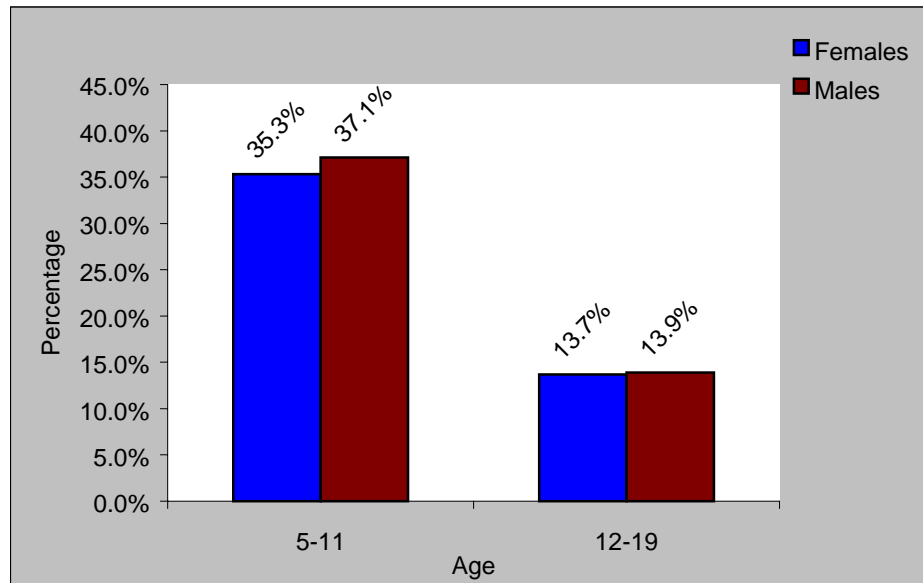


Figure 2. Percent distribution of height and weight measurements collected among school age children (n=19,441).



Approximately 75% of students were between 11 and 14 years of age for the FFQ assessment and between 5 and 11 years old for the height and weight measurements. In the 5 to 11 year olds height and weight records, there were only 6 children 8 years old or younger. The older age groups (15-18 and 12-19 year olds) made up 17.5% and 27.6%, respectively, of the student population that participated in the study. The difference in age groups is due to the source of the data reporting: the FFQ analysis is completed by Harvard School of Public Health, and the height and weight data is analyzed by the Center for Disease Control and Prevention.

RESULTS

Section 1: Dietary Assessment Among Students Aged 11-14, and Height and Weight Measurements of Students aged 5-11.

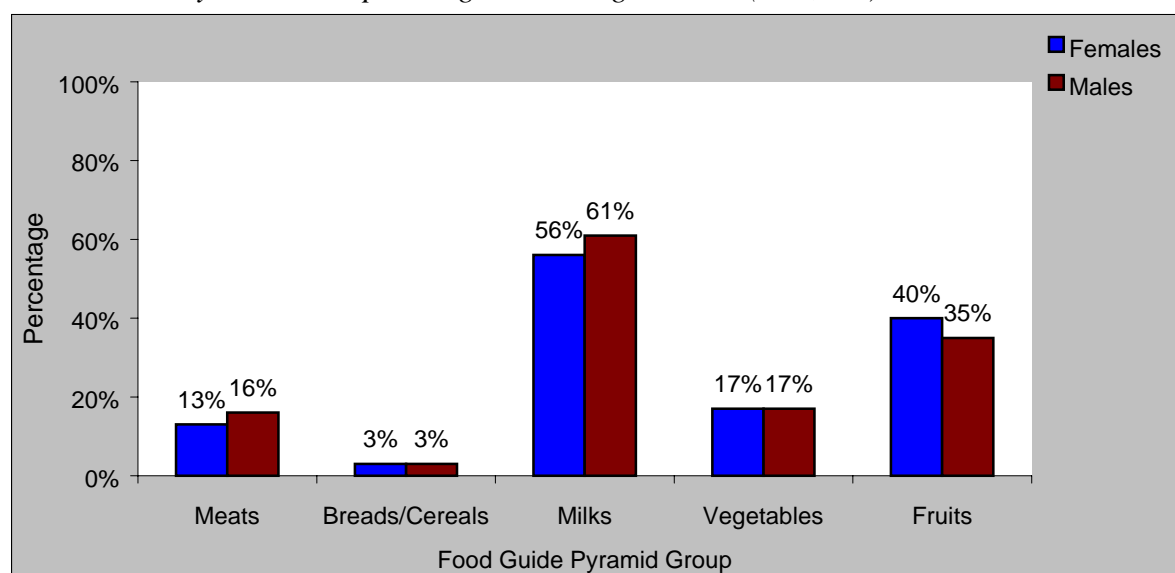
A mandated performance measure in the Missouri School-Age Children's Health Services program is to assess the dietary intake of 5th grade populations in Missouri. Given this objective, the following analysis is comprised of the food frequency data obtained from the 11 to 14 years age group (i.e., the age group containing 5th grade students). The height and weight measurement data is given for the students aged 5-11. **Table 1** displays the mean number of servings per day consumed by the 11-14 age group with respect to the five food groups in the Food Guide Pyramid, as well as the mean number of servings per day consumed of sweets and fats. It was found that the students did not reach the recommended number of servings of the Meat, Bread and Cereal, and Vegetable Groups as determined by the Food Guide Pyramid. The students did, however, meet the recommended number of servings of the Milk and Fruit Groups. It should also be noted that the greatest number of servings were from Sweets and Fats compared to the other five Food Guide Pyramid Groups. **Figure 3** displays the actual percent of female and male students who met the minimum recommended number of servings for each of the five food groups.

Table 1. Mean number of servings per day by Food Guide Pyramid Categories among students aged 11-14 (n=7,602).

Pyramid Food Group	Mean (Females)	Mean (Males)	Recommended
Meats	1.1	1.2	2-3
Breads/Cereals	2.0	1.9	6-11
Milks	2.4	2.5	2-3
Vegetables	1.9	1.8	3-5
Fruits	2.3	2.1	2-4
Sweets	2.7	2.8	Minimal
Fats	3.3	3.2	Minimal

Source: Harvard Food Frequency Questionnaire

Figure 3. Percent of students meeting the recommended number of servings per day by Food Guide Pyramid Group among students aged 11-14 (n=7,602).

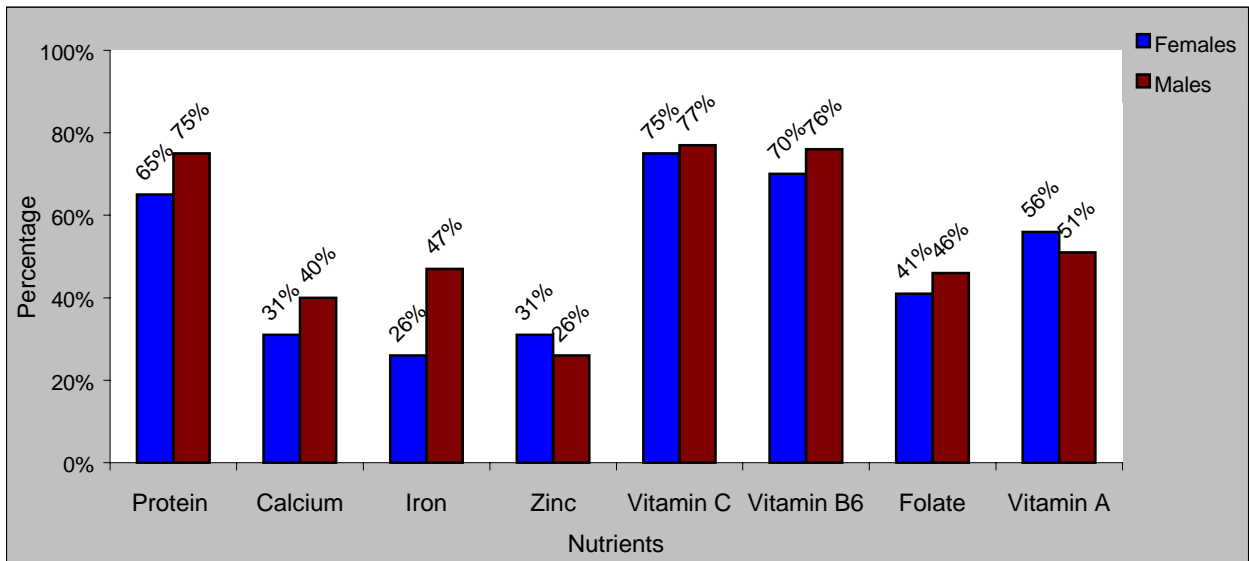


Source: Harvard Food Frequency Questionnaire

The highest percentages of female and male students meeting the recommended number of servings per day by the Food Guide Pyramid were found in the Milk group. That is to say, at least half of the students within this age group met the recommended number of servings of milk per day. The percentages were lowest in the Bread and Cereal group. Only 3% of both the male and female students met the recommended number of servings of breads and cereals.

Figure 4 shows the percent of female and male students meeting the recommended daily allowances (RDA) of specific nutrients indicative of a healthy diet. The largest proportions of female and male students were found to have met the RDAs for protein, Vitamin C, and Vitamin B6. Alternatively, the smallest proportions of students were found to have met the RDAs for calcium, iron, and zinc.

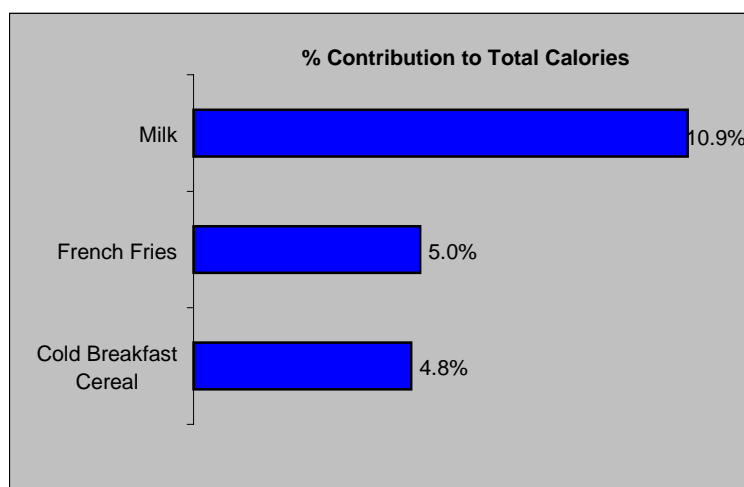
Figure 4. Percent of students aged 11-14 meeting the Recommended Daily Allowances (RDA) of specified nutrients (n=7,602).



Source: Harvard Food Frequency Questionnaire

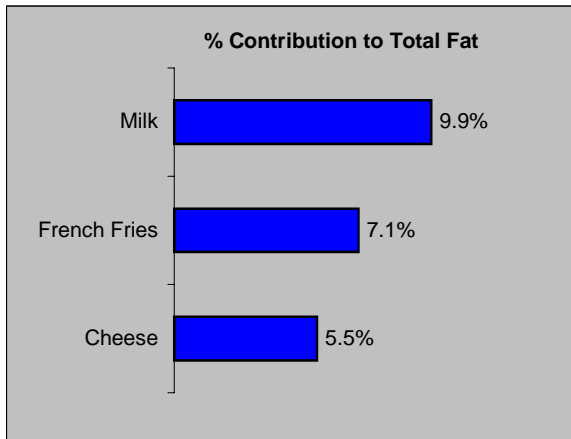
The food frequency questionnaire consisted of 84 selected foods that were used to assess the dietary intake of the student population. The top three foods contributing to the total caloric, various fat, and nutrient intakes are shown in the following figures. **Figures 5-9** show the percentages of the top three foods contributing to total caloric, fat, saturated fat, monounsaturated fat, and polyunsaturated fat intakes among students aged 11-14 (n=7,602).

Figure 5. Percent of the top three foods contributing to total calories per day.



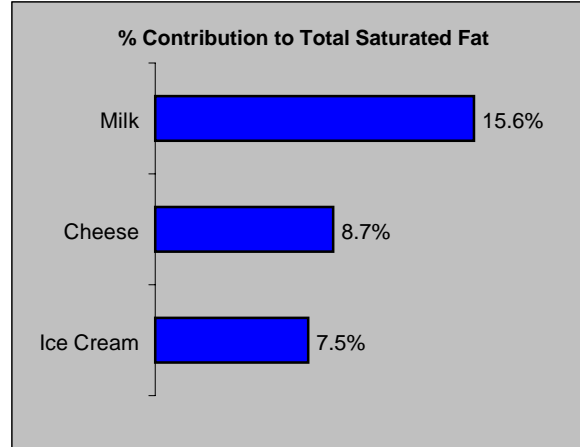
Source: Harvard Food Frequency Questionnaire

Figure 6. Percent of the top three foods contributing to total fat per day.



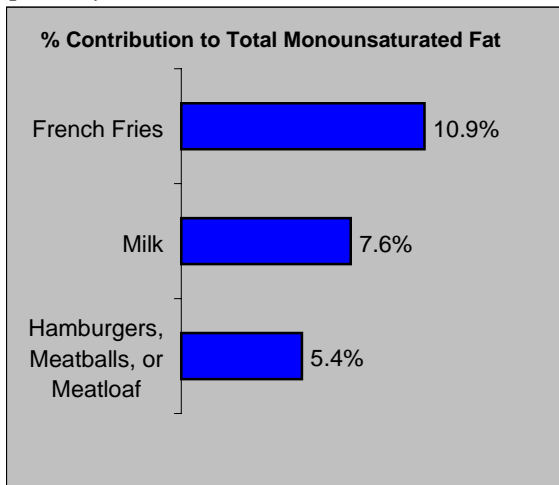
Source: Harvard Food Frequency Questionnaire

Figure 7. Percent of the top three foods contributing to total saturated fat per day.



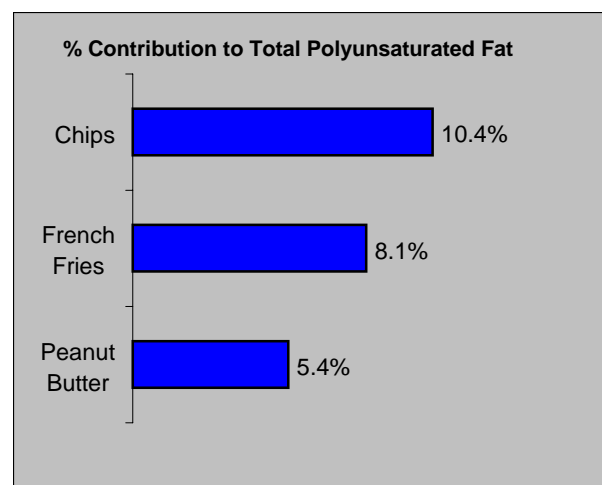
Source: Harvard Food Frequency Questionnaire

Figure 8. Percent of the top three foods contributing to total monounsaturated fat per day.



Source: Harvard Food Frequency Questionnaire

Figure 9. Percent of the top three foods contributing to total polyunsaturated fat per day.

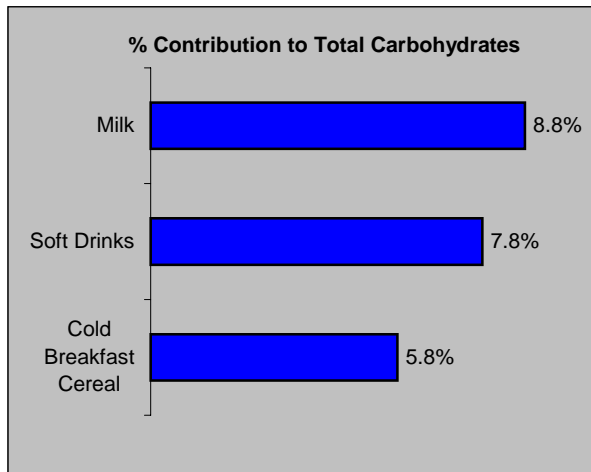


Source: Harvard Food Frequency Questionnaire

The results showed that milk, french fries, and cheese made up approximately 22.5% of the total amount of fat consumed by the 11-14 year old population. Milk, cheese and ice cream made up about 31.8% of the total saturated fat intake. Additionally, french fries, milk, and hamburgers, meatballs, or meatloaf made up about 23.9% of the total monounsaturated fat intake, while chips, french fries, and peanut butter made up about 23.9% of the total polyunsaturated fat intake among the children.

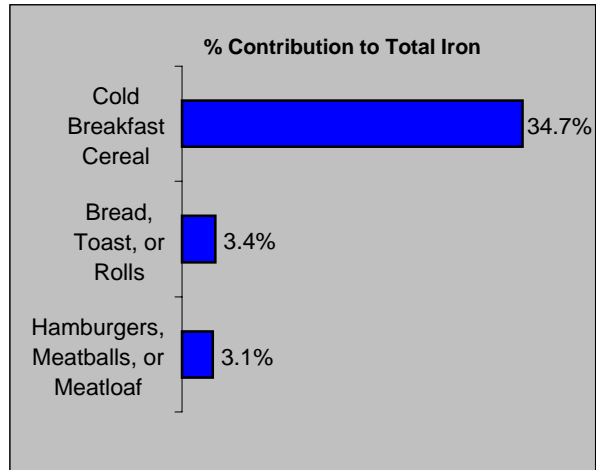
Figures 10-13 display the percentages of the top three foods contributing to total carbohydrate, iron, protein, and calcium intakes among students aged 11-14 (n=7, 602).

Figure 10. Percent of the top three foods contributing to total carbohydrates per day.



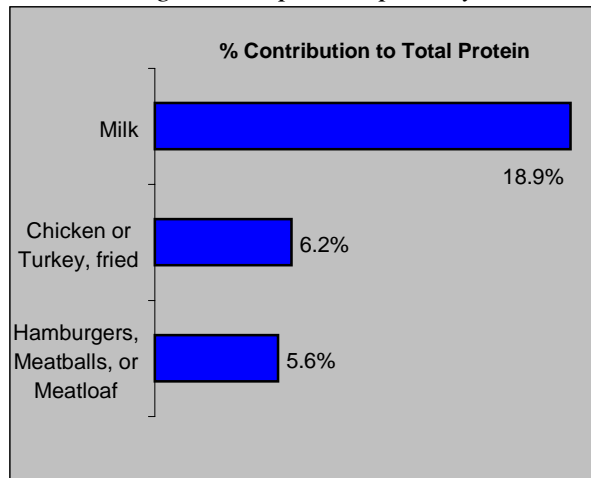
Source: Harvard Food Frequency Questionnaire

Figure 11. Percent of the top three foods contributing to total iron per day.



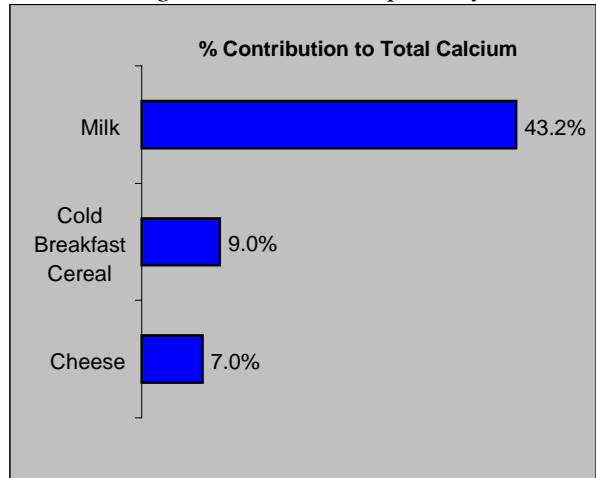
Source: Harvard Food Frequency Questionnaire

Figure 12. Percent of the top three foods contributing to total protein per day.



Source: Harvard Food Frequency Questionnaire

Figure 13. Percent of the top three foods contributing to total calcium per day.



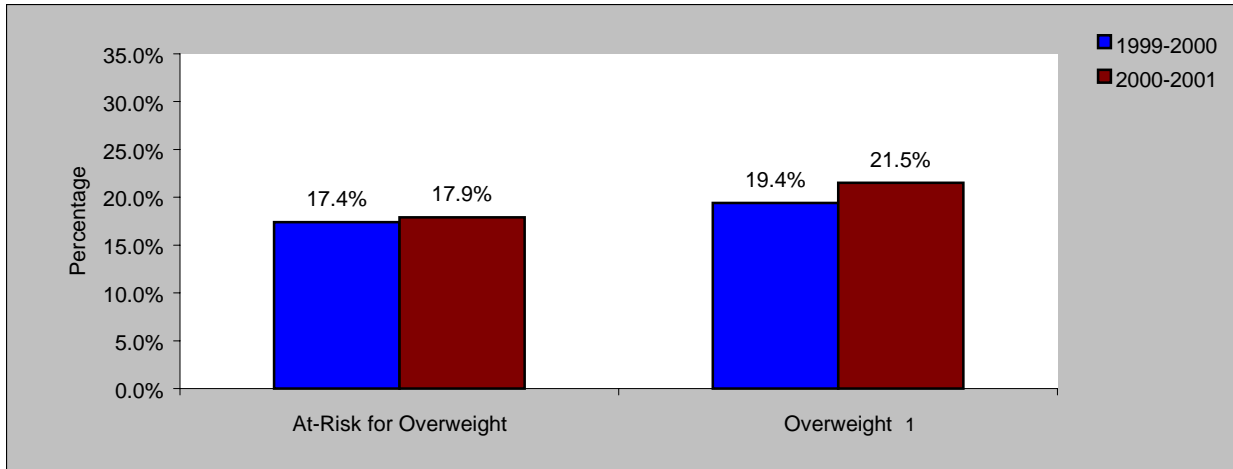
Source: Harvard Food Frequency Questionnaire

It was found that milk, soft drinks, and cold breakfast cereal were the top three foods that contributed approximately 23.4% to the students' total carbohydrate intake. Cold breakfast cereal, bread, toast, or rolls, and hamburgers, meatballs, or meatloaf made up about 41.2% of the total amount of iron consumed. Milk, fried chicken or turkey, and hamburgers, meatballs, or meatloaf were the foods contributing most to total protein intake (30.7%). Milk, cold breakfast cereal, and cheese made up nearly 60% of the total amount of calcium consumed by the students.

Height and weight measurements were taken to calculate each student's body mass index (BMI), which subsequently was used to determine the nutritional status of the student populations. BMI is defined as $[\text{weight in pounds} \div \text{height in inches} \div \text{height in inches}] \times 703$. More precisely, the percent overweight and the percent at-risk for becoming overweight both were determined by comparing the students' BMI to age-based and sex specific national norms. Overweight is

defined as a BMI at or above the 95th percentile by age, while at-risk for overweight is defined as a BMI between the 85th and less than 95th percentile by age. **Figure 14** presents these percentages for the last two school years, and **Figure 15** compares the percentages between different races and one ethnicity, for the 2000-2001 school year (the *n* reflects only those races/ethnicity that were included in the graph).

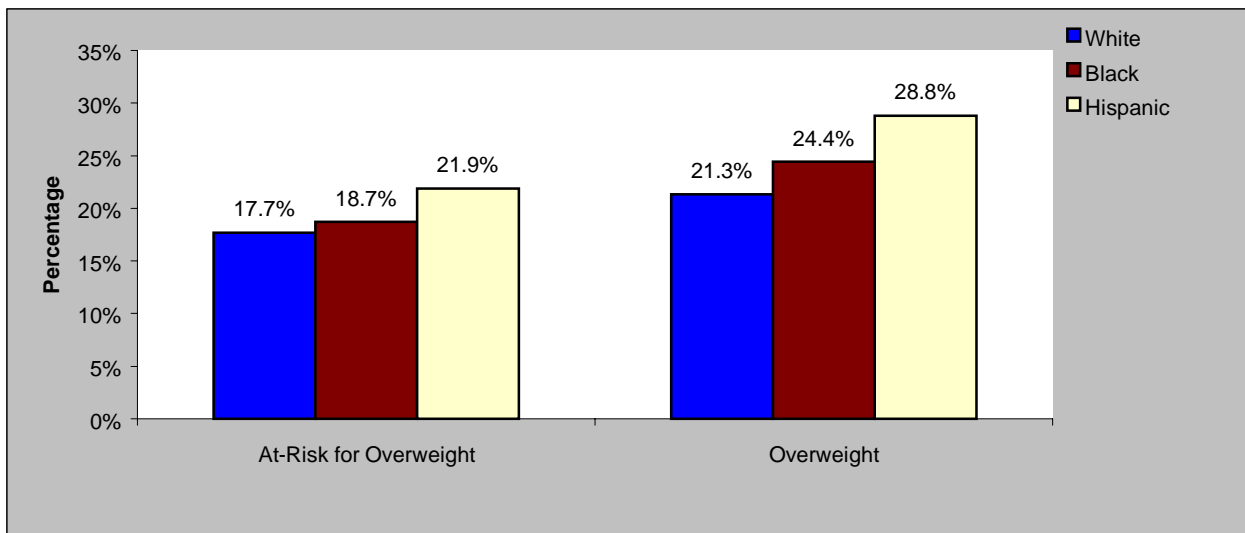
Figure 14. Percent of children aged 5-11 who are at-risk for overweight and percent of children who are overweight, by school year (*n*=4,534 for 1999-2000; *n*=5,659 for 2000-2001).



Source: Centers for Disease Control

¹Statistically significant at the 95% confidence level using exact binomial confidence intervals.

Figure 15. Percent of children aged 5-11 who are at-risk for overweight and percent of children who are overweight, by race and ethnicity for school year 2000-2001 (*n*=5,556).



Source: Centers for Disease Control

From the 1999-2000 school year to the 2000-2001 school year, there appears to be no statistically significant change in the percent of at-risk for overweight among children aged 5-11. However, there was an increase in the percent of children in this age group who were overweight when comparing the school year 1999-2000 to the school year 2000-2001. In 1999-2000 school year 19.4% (confidence interval (CI) 18.7% to 20.1%) of the students were overweight whereas in school year 2000-2001 21.5% (CI 20.8% to 22.2%) were overweight. When the confidence intervals for the two percentages do not overlap, we can be 95% confident that the observed difference in rates is statistically significant. In the 2000-2001 school year, the White population had the lowest percentage of overweight students followed by the Black population who had the second highest and the Hispanic population who had the highest percentage of overweight students. In regard to at-risk for overweight, the White and Black student populations had almost similar rates of occurrence while the Hispanic population had the highest percentage of at-risk for overweight students. However, none of these rates were statistically different and caution should be taken when comparing the Hispanic population since the count is much lower than the White and Black population numbers (total counts for all 5-11 year olds: White n=13,252, Black n=729, and Hispanic n=146).

Section 2: Dietary Assessment Among Students Aged 15-18 and Height and Weight Measurements of Students Aged 12-19.

An elective measure based on the Department of Health and Senior Services' Integrated Strategic Plan 2001-2005, and the adolescent risk behaviors identified by the Centers for Disease Control and Prevention was to assess the dietary intake of adolescent populations in Missouri. Given this objective, the following analysis is comprised of the food frequency data obtained from the 15-18 year old students. The height and weight measurement data is given for the students aged 12-19. **Table 2** displays the mean number of servings per day consumed by the 15-18 year old age group with respect to the five food groups in the Food Guide Pyramid, as well as the mean number of servings per day consumed of sweets and fats.

Table 2. Mean number of servings per day by Food Guide Pyramid Categories among students aged 15-18 (n=1,743).

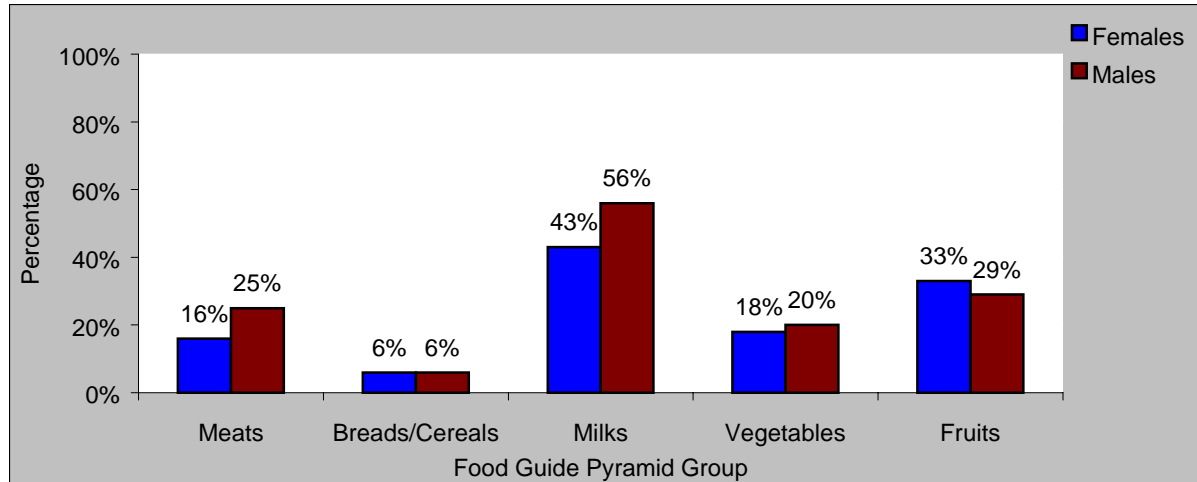
Pyramid Food Group	Mean (Females)	Mean (Males)	Recommended
Meats	1.2	1.5	2-3
Breads/Cereals	2.4	2.4	6-11
Milks	2.1	2.4	2-3
Vegetables	1.9	2.0	3-5
Fruits	1.8	1.7	2-4
Sweets	3.2	3.5	Minimal
Fats	3.7	3.9	Minimal

Source: Harvard Food Frequency Questionnaire

As was found in their younger counterparts, these older students also did not reach recommended number of servings of the Meat, Bread and Cereal, and Vegetable Groups as determined by the Food Guide Pyramid. In addition, the 15-18 year old population did not meet the recommended number of servings of the Fruit Group, which the 11-14 year old population did meet. The

largest number of mean servings for the 15-18 year old students was from the Sweets and Fats Groups, which was also the trend for the 11-14 year old population.

Figure 16. Percent of students meeting the recommended number of servings per day by Food Guide Pyramid Group among students aged 15-18 (n=1,743).

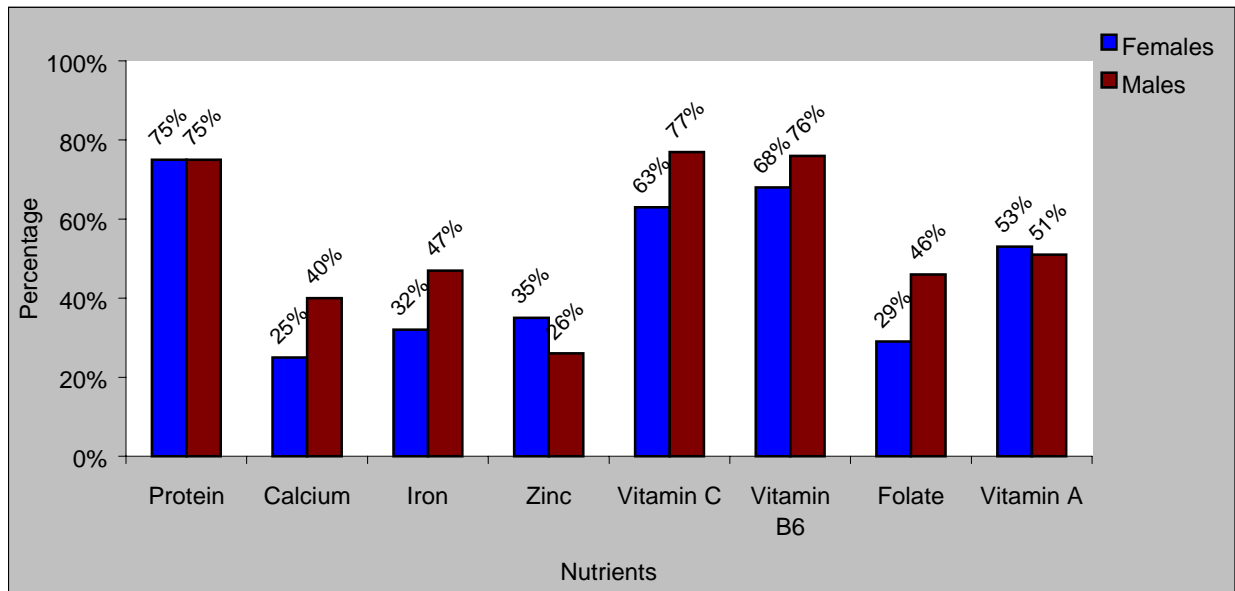


Source: Harvard Food Frequency Questionnaire

Figure 16 shows the highest percentages of female and male students meeting the recommended number of servings per day by the Food Guide Pyramid were found in the Milk group. That is to say, over half of the males and approximately 2 out of every 5 females within this age group met the recommended number of servings of milk per day. Only 6% of both the male and female students met the recommended number of servings of breads and cereals. The males showed a higher percentage than females who met the recommended number of servings from the Meat and Milk groups per day.

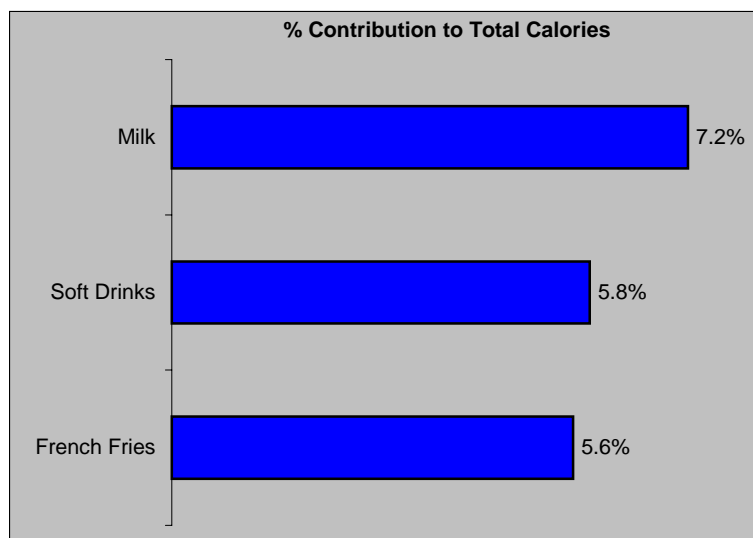
Figure 17 shows the percent of female and male students meeting the recommended daily allowances (RDA) of specific nutrients indicative of a healthy diet. Approximately 3 out of 4 students were found to have met the RDAs for protein, Vitamin C, and Vitamin B6. Only half of the students met the RDA for Vitamin A, and even smaller proportions of students were found to have met the RDAs for calcium, iron, and zinc. **Figures 18-22** show the percentages of the top three foods contributing to total caloric, fat, saturated fat, monounsaturated fat, and polyunsaturated fat intakes among students aged 15-18 (n=1,743). The results show that milk, soft drinks, and french fries contributed to approximately 18.6% of the total caloric intake for this age group. French fries, hamburgers, meatballs or meatloaf, and chocolate made up approximately 21.1% of the total fat intake. Milk, cheese, and chocolate contributed to 28.2% of total saturated fat intake. Additionally, french fries, hamburger products, and milk made up about 24.4% of the total monounsaturated fat intake while chips, french fries, and fried chicken or turkey contributed to 27.6% of the total polyunsaturated fat intake among 15-18 year olds. The percentages of the top three foods contributing to total carbohydrate, iron, protein, and calcium intakes among students aged 15-18 (n=1,743) are displayed in **Figures 23-26**.

Figure 17. Percent of students aged 15-18 meeting the Recommended Daily Allowances (RDA) of specific nutrients (n=1,743).



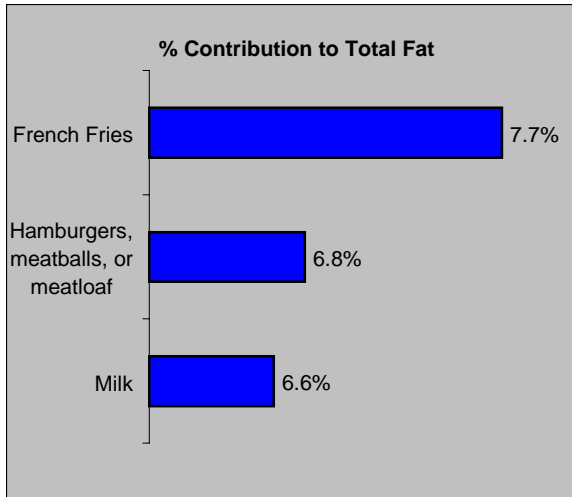
Source: Harvard Food Frequency Questionnaire

Figure 18. Percent of the top three foods contributing to total calories per day.



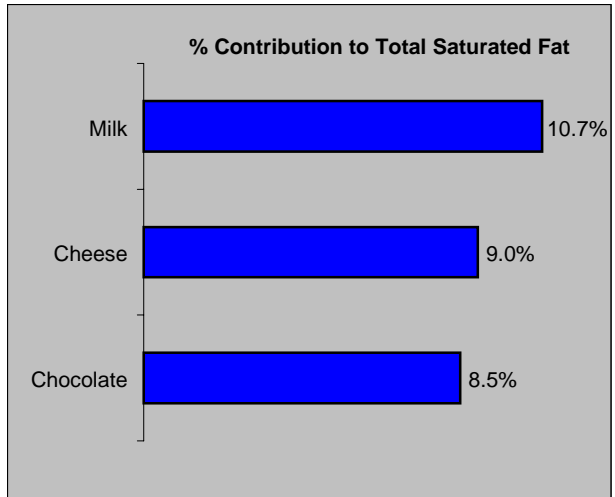
Source: Harvard Food Frequency Questionnaire

Figure 19. Percent of the top three foods contributing to total fat per day.



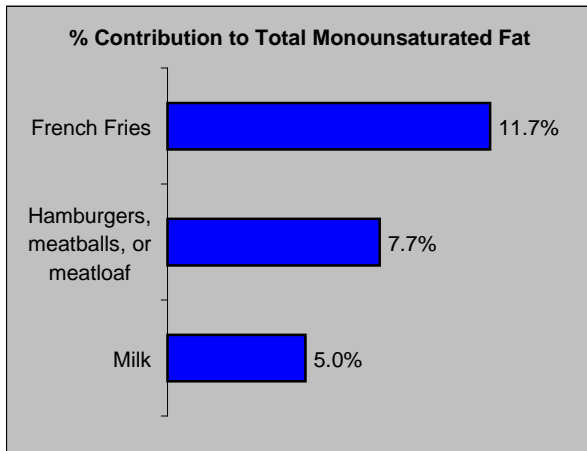
Source: Harvard Food Frequency Questionnaire

Figure 20. Percent of the top three foods contributing to total saturated fat per day.



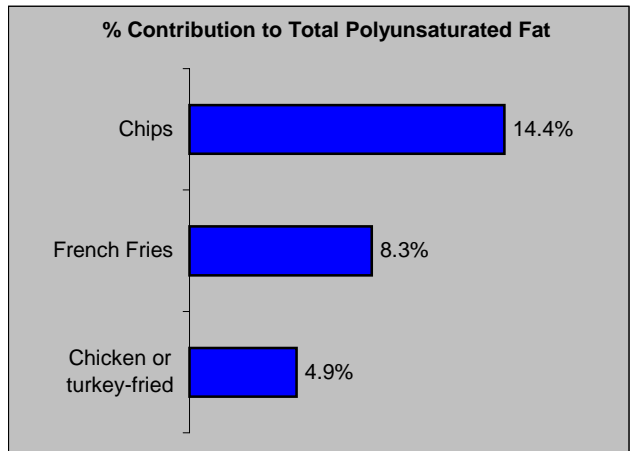
Source: Harvard Food Frequency Questionnaire

Figure 21. Percent of top three foods contributing to total monounsaturated fat per day.



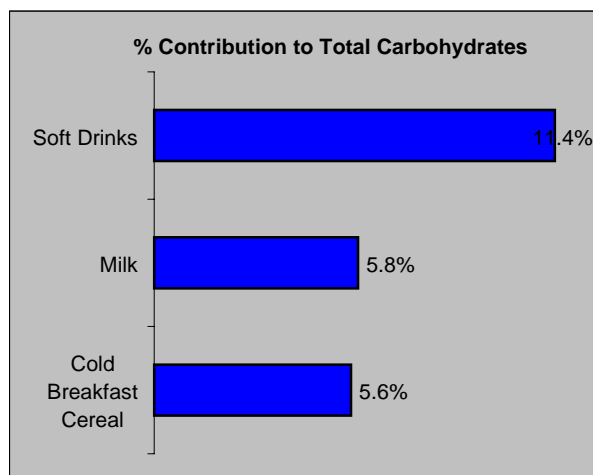
Source: Harvard Food Frequency Questionnaire

Figure 22. Percent of top three foods contributing to total polyunsaturated fat per day.



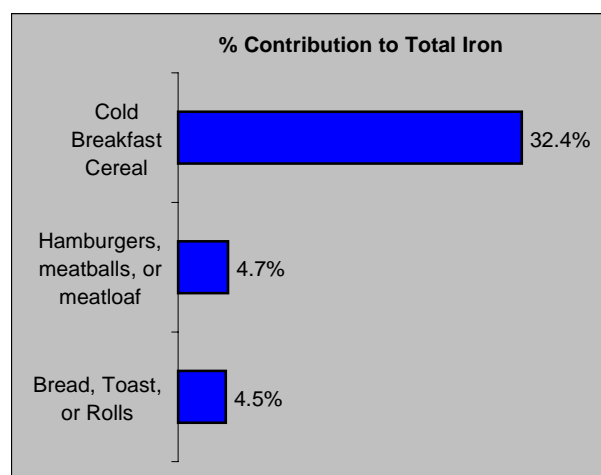
Source: Harvard Food Frequency Questionnaire

Figure 23. Percent of the top three foods contributing to total carbohydrates per day.



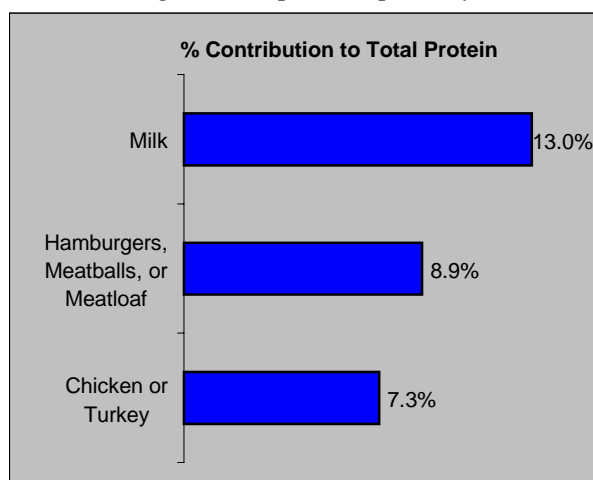
Source: Harvard Food Frequency Questionnaire

Figure 24. Percent of the top three foods contributing to total iron per day.



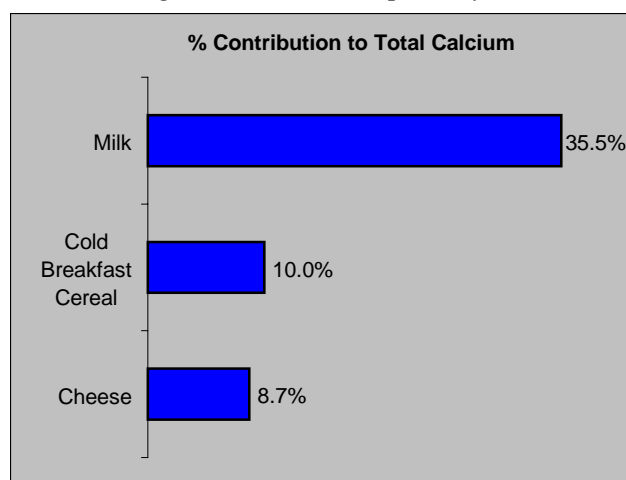
Source: Harvard Food Frequency Questionnaire

Figure 25. Percent of the top three foods contributing to total protein per day.



Source: Harvard Food Frequency Questionnaire

Figure 26. Percent of the top three foods contributing to total calcium per day.



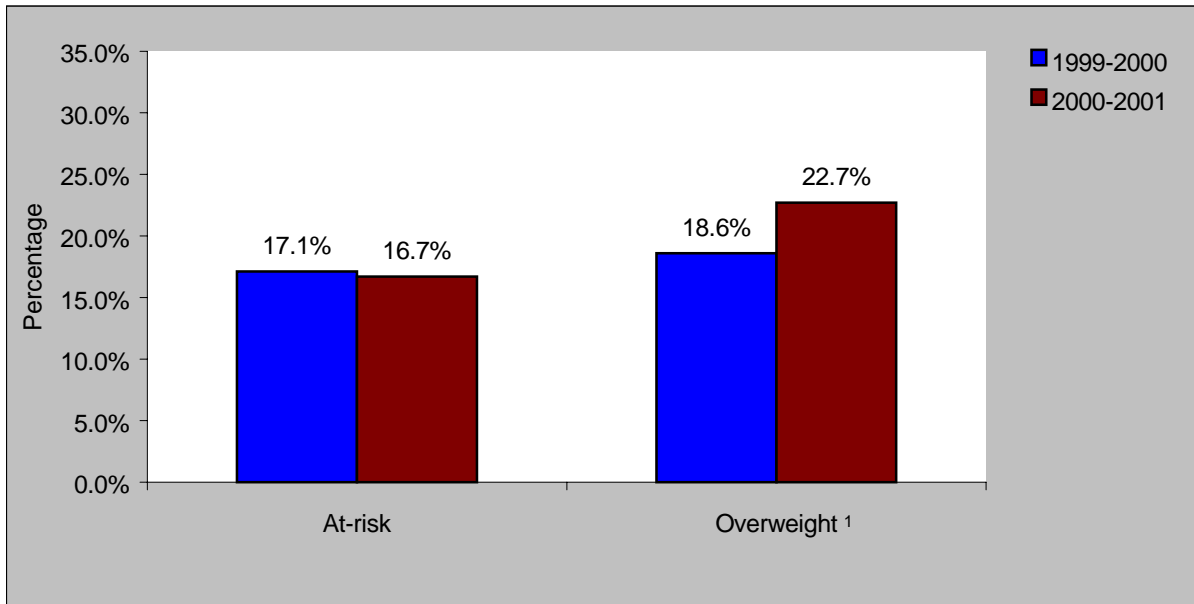
Source: Harvard Food Frequency Questionnaire

The results indicate that soft drinks, milk, and cold breakfast cereal were the top three foods that contributed approximately 22.8% of the students' total carbohydrate intake. Cold breakfast cereal, hamburgers, meatballs, or meatloaf, and bread, toast, or rolls, made up about 41.6% of the total amount of iron consumed. Milk, hamburgers, meatballs, or meatloaf, and chicken or turkey were the foods contributing most to total protein intake (29.2%). Milk, cold breakfast cereal, and cheese made up over 50% of the total amount of calcium consumed by the students. These trends were very similar to the 11-14 year age group for these same nutrients.

Height and weight measurements were collected and used to calculate the students' body mass index (BMI). BMI was used to determine the nutritional status of the student populations, i.e., the percent overweight and the percent at-risk for overweight. **Figure 27** presents the percentages of at-risk for overweight and overweight adolescents for the last two school years,

and **Figure 28** compares the percentages between the two races, for the 2000-2001 school year (the *n* reflects only those races that were included in the graph).

Figure 27. Percent of students aged 12-19 who are at-risk for overweight and percent of students who are overweight, by school year (*n*=1,239 for 1999-2000 and *n*=1,913 for 2000-2001).

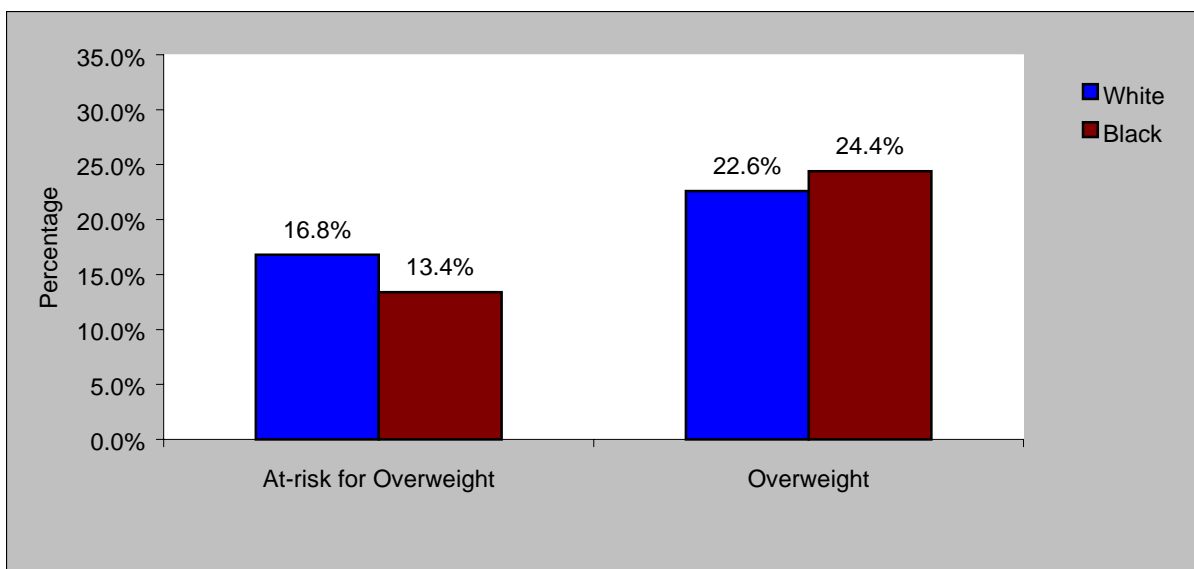


Source: Centers for Disease Control

¹Statistically significant at the 95% confidence level using exact binomial confidence intervals.

Figure 28. Percent of 12-19 year olds who are at-risk for overweight and percent overweight, by race and ethnicity for the 2000-2001 school year (*n*=1,864).

Source: Centers for Disease Control

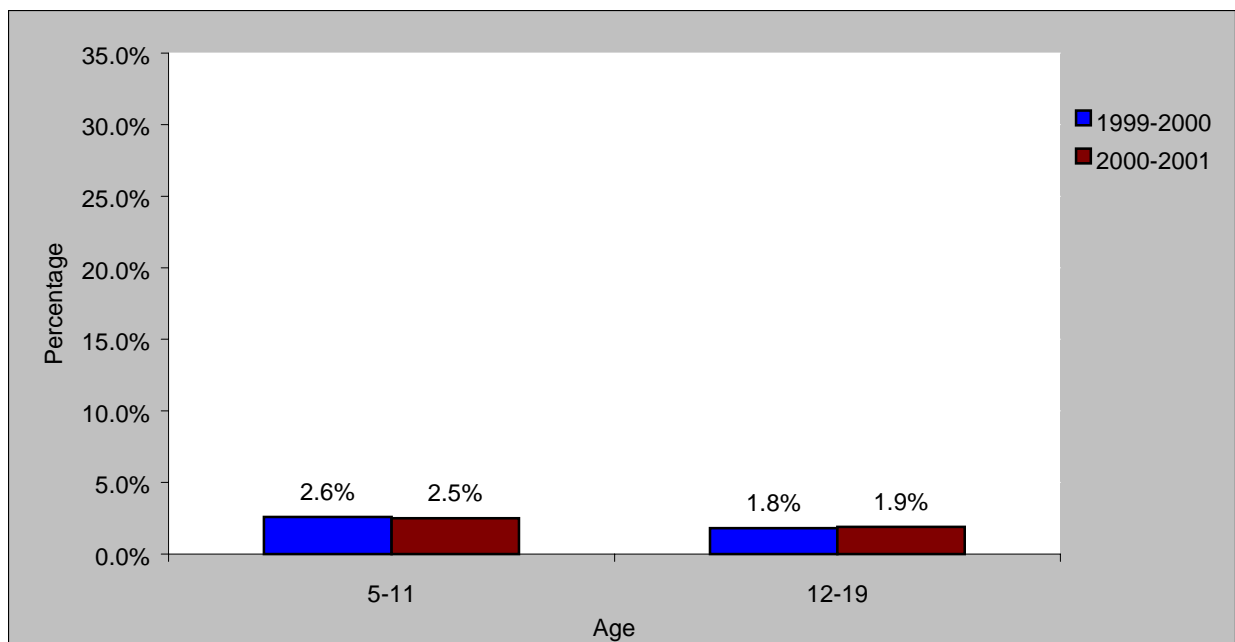


From the 1999-2000 school year to the 2000-2001 school year, there appears to be no statistically significant change in the percent at-risk for overweight among adolescents who were measured. However, there was an increase in the percent of students in this age group who were overweight when comparing the 1999-2000 school year to the 2000-2001 school year. In the 1999-2000 school year 18.6% (CI 17.3% to 19.9%) of the students were overweight versus in school year 2000-2001 22.7% (CI 21.5% to 23.9%) were overweight. Since the confidence intervals for the two percentages do not overlap, we can be 95% confident that the observed difference in rates is statistically significant. In the 2000-2001 school year the Black students had the lower percentage of students who were at-risk of overweight but had the higher rate for students who were overweight when compared to the White student population. However, none of these rates were statistically different. Percentages were not calculated for the Hispanic population due to the low number of records (less than 100 records) available for the analysis (total counts for all 12-19 year olds: White n=4,610, Black n=127, and Hispanic n=34).

Section 3: Students Aged 5-11 and Aged 12-19 Who Are Underweight.

The BMIs calculated for both age groups were used to determine the nutritional status of the student populations in regard to percent underweight. Underweight is defined as a BMI below the 5th percentile for age. **Figure 29** presents the percentages of children and adolescents who are underweight from the last two school years. From the 1999-2000 school year to the 2000-2001 school year there appears to be no significant change in percentage rates for both age groups.

Figure 29. Percent of students aged 5-11 years and 12-19 years who are underweight by school year.



Source: Centers for Disease Control

CONCLUSIONS

These findings indicate a need to target intervention strategies toward pre-adolescent and adolescent students to promote healthy eating habits. Development of educational interventions to encourage both of the age groups studied (11-14 and 15-18 age groups) to increase consumption of foods in the major food groups: Meat, Bread and Cereal, and Vegetable Food Guide Pyramid Groups. Ways to increase the consumption of foods rich in calcium, zinc, iron, and folate should be implemented as well as strategies to decrease the consumption of fats and sweets. In addition, the data indicates that there tends to be a drop in milk consumption in females students in the older age group compared to the younger female population. Focusing interventions on the adolescent female audience to increase the consumption of milk could encourage lifelong habits and increase calcium intake, possibly preventing osteoporosis later in life. The adolescent female population would also benefit from interventions that develop habits of consuming adequate amounts of folate, which is recommended for all childbearing age females.

It should be noted that interventions, which focus on increasing milk consumption to enhance the intake of calcium and other nutrients, should emphasize low fat milk choices in order to reduce fat intake. Milk is indicated as the top food contributing to total caloric and saturated fat intake for both age groups and the top contributor to total fat for the younger age group. Emphasizing low fat dairy options would have a two-fold affect of not only enhancing the nutrient intake but also reducing fat consumption in the diet.

The percent overweight is on the rise for both student populations, when comparing the last two school years. This may relate not only to physical activity habits, which have been shown to decline as children get older, but also the high intake of sweets and fats by students. This trend corresponds to national studies, which have shown a continual increase in the number of overweight children and teens over the past two decades¹. Our data also show that the highest number of servings for both age groups is from the sweets and fats group. Promoting intervention programs that emphasize the importance of decreasing simple sugars and fats in the diet may improve these rates and lower the chances of nutrition-related health problems, such as diabetes and heart disease.

The data regarding race and ethnicity do not indicate definite trends and this is mostly likely due to the small numbers of non-White children participating in the program. However, it has been shown in a national longitudinal study that the fastest increase in overweight has been among Black and Hispanic children². This indicates a need to develop interventions that meet the needs of pre-adolescent and adolescent individuals from different racial and ethnic backgrounds.

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